NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH) FIRE FIGHTER FATALITY INVESTIGATION AND PREVENTION PROGRAM, 1998 - 2005

The National Institute for Occupational Safety and Health (NIOSH) is an agency of the United States government located in the Department of Health and Human Services, and is part of the Centers for Disease Control and Prevention (CDC). NIOSH is responsible for conducting research and making recommendations for the prevention of work-related illnesses and injuries. In fiscal year 1998, NIOSH initiated a new program entitled, NIOSH Fire Fighter Fatality Investigation and Prevention Program (FFFIPP). NIOSH is seeking public comments on the progress and future directions of this program. A summary of the progress and possible future activities for this initiative are provided in this document.

Background

The United States currently depends on approximately 1.1 million fire fighters, three out of four who are volunteers, to protect its citizens and property from losses caused by fire. Data from recent years indicate that approximately 56 fire fighters die each year from fatal traumatic injuries and another 46 die from cardiovascular-related disease in the line-of-duty. Approximately 95,000 fire fighters are injured at work each year. Traumatic injuries include internal trauma, asphyxiation, crushing injuries, burns, drowning, electrical shock, etc. The number of fire fighters experiencing nonfatal cardiac events each year is unknown.

In fiscal year 1998, Congress recognized the need for further efforts to address the continuing problem of occupational fire fighter fatalities and appropriated funds for NIOSH to: "…conduct fatality assessment and control evaluation investigations to gather information on factors that may have contributed to traumatic occupational fatalities, identify causal factors common to fire fighter fatalities, provide recommendations for prevention of similar incidents, formulate strategies for effective intervention, and evaluate the effectiveness of those interventions."

In January 1998, NIOSH convened a stakeholders' meeting in Washington, DC to obtain input on this new NIOSH program. In attendance were representatives from across the fire service, including a number of fire departments, union representatives, fire service organizations and federal agencies. This stakeholder meeting was useful in helping NIOSH plan the appropriate direction for this initiative. The primary message communicated to NIOSH at this meeting was the need to focus the program on conducting line-of-duty investigations to identify factors contributing to fire fighter fatalities, and to disseminate this information to fire departments across the country. Throughout the initiative NIOSH has strived to encourage the use of investigations and associated recommendations in fire fighter safety and health efforts.

NIOSH is again seeking input from stakeholders to ensure that the NIOSH FFFIPP is meeting the needs of stakeholders, and to identify ways in which NIOSH might improve upon the program to increase its impact on the safety and health of fire fighters across the United States. A stakeholder meeting will be held March 22, 2006 in Washington, DC. Input will be sought at this meeting and through a public docket.

Investigations

NIOSH is notified of fire fighter line-of-duty deaths by the U.S. Fire Administration (USFA). Individual fire departments and unions sometimes also notify NIOSH of deaths and serious injuries of fire fighters in the line-of-duty, and specifically request investigations.

NIOSH staff conduct on-site investigations to gather facts on the incident and potential contributory factors. Investigators interview fire department personnel, take photographs and measurements at the site, and review all applicable records (e.g. standard operating procedures/guidelines (SOPs/SOGs), dispatch records, training records, medical records, and coroner/medical examiner reports). In cases in which the function of respiratory protective equipment may have been a factor, NIOSH conducts laboratory evaluations of the performance of self-contained breathing apparatus (SCBA). In select cases, when warranted, NIOSH seeks expert evaluations of other types of fire service equipment, including oxygen regulators that have caught on fire, diving suits in underwater incidents, and personal alert safety system (PASS) devices that were not heard or barely heard by nearby fire fighters or rescue crews. NIOSH has also supported the development, by the National Institute of Standards Technology, of computerized fire simulation models for some investigations. These computerized models have helped to explain and verify fire conditions and have been useful tools for testing the validity of recommendations.

A report is completed for each investigation summarizing the sequence of events that led to the fire fighter death or injury and making recommendations for preventing future deaths and injuries under similar circumstances. An important feature of the NIOSH investigation model is that investigations do not seek to place blame on fire departments or individual fire fighters or officers; rather, the goal is to identify steps that could be taken for prevention in the future. No identifiers are included in the report, as this information is not necessary to meet prevention goals, and inclusion of such information might discourage participation of fire departments and personnel in the NIOSH investigation.

Since the inception of the FFFIPP through February 2006, NIOSH, with the cooperation of fire departments and fire fighters around the country, has conducted 324 fatality investigations in 48 states. These 324 investigations accounted for 366 fire fighter deaths. Additionally, nine nonfatal injury investigations were conducted involving 19 fire fighters. Based on data reported by the U.S. Fire Administration (USFA) on the annual number of fire fighter fatalities, the FFFIPP investigated 44% of fire fighter fatalities for the period 1988 to 2004, excluding the fire fighter deaths associated with the 2001 World Trade Center attacks. The fatality investigations were conducted at 183 career and 141 volunteer fire departments. Traumatic injury incidents accounted for 175 of the investigations (71 structure fires, 53 motor vehicle-related, 16 training, 15 wildland, 9 falls, 6 explosions, and 5 “others” [i.e., helicopter crash, electrocution, homicide, drowning, and fireworks]). Cardiovascular/medical incidents accounted for 149 investigations. The investigations have taken place in all states except Idaho and Rhode Island.

In addition to conducting investigations of line-of-duty deaths and nonfatal injuries of fire fighters, the NIOSH FFFIPP has conducted 20 Health Hazard Evaluations (HHEs) in the

fire service in the past 8 years. NIOSH HHEs are similar to line-of-duty fatality and injury investigations in that they frequently involve on-site visits, interviews of personnel, review of records, and recommendations for prevention. However, there are also methodologic differences between HHEs and line-of-duty fatality and injury investigations. HHEs frequently involve collection of data and medical testing of workers not reporting symptoms or illnesses, whereas line-of-duty fatality and injury investigations focus on fire fighters who died or were injured. Additionally, HHEs use epidemiologic approaches to assess if associations exist between workplace exposures and symptoms and illnesses reported by employees. HHEs conducted through the FFFIPP have addressed acute respiratory effects of smoke, exposure to diesel exhaust, exposure to blood borne pathogens, and cancer clusters. Appendix 1 lists a finalized HHE report and another document including reports for several HHEs conducted in the fire service. More information on the HHE program is available at: http://www.cdc.gov/niosh/hhe/HHEprogram.html.

When multiple NIOSH investigations identify common safety and health concerns, NIOSH develops educational documents that summarize the hazard and recommended prevention measures. Examples of hazards addressed by these educational documents include: structural collapse, live-fire training in acquired structures, dive training, and hazards of working alongside roadways. A listing of these educational documents as well as other FFFIPP publications is provided in Appendix I.

Recommendations

Prevention recommendations are a capstone of the investigative reports and NIOSH summary documents addressing specific hazards faced by fire fighters. Recommendations draw upon and cite consensus and mandatory standards such as those promulgated by the National Fire Protection Association (NFPA) and Occupational Safety and Health Administration (OSHA), fire fighting practices recommended in fire service texts, and findings and recommendations in the safety and medical literature.

Recommendations, which have been made most frequently have been directed to fire departments and can be grouped into ten general categories:

- cardiovascular health (e.g. ensuring that medical evaluations screen fire fighters for coronary artery disease risk factors),
- fitness and wellness programs (e.g. implementing mandatory fitness programs that are positive, non-punitive and individualized),
- standard operating procedures/guidelines (e.g. developing and enforcing written procedures/guidelines and ensuring that all officers and fire fighters are trained and knowledgeable of the procedures/guidelines),
- communications (e.g. ensuring that two-way communication is established and coordinated between incident management and fire fighter crews),
- incident command (e.g. ensuring that the Incident Commander is clearly identified and maintains the role of directing operations and scene management),
- motor vehicle-related (e.g. enforcing policies that require all fire personnel riding in emergency vehicles to be seat-belted),
- personal protective equipment (e.g. ensuring that SCBA are properly inspected, used and maintained),

- strategies and tactics (e.g. suspending defensive exterior fire fighting operations prior to switching to interior fire fighting operations to minimize hazards to fire fighters working inside structures),
- rapid intervention teams (e.g. ensuring that a properly trained and equipped rapid intervention team is in position when other fire fighters enter a dangerous environment, such as a burning structure), and
- staffing (e.g. ensuring that adequate personnel and equipment are on scene in accordance with NFPA standards).

Recommendations in NIOSH fatality investigative reports and summary documents may be used by individual fire departments, unions, state governments, and public and private fire service agencies to identify and advocate for needed changes in: fire department policies and procedures to better protect fire fighters and ensure well-being; training to ensure that fire fighters have the necessary knowledge and skills to work safely; and consensus and mandatory standards to establish minimum conditions for fire fighter safety and health.

NIOSH recommendations have also been targeted to:

- manufacturers to enhance safety aspects of fire service equipment,
- municipalities to address organization and coordination of fire services as well as safety requirements related to buildings and structures,
- standard setting bodies to modify or develop new standards, and
- research organizations to enhance and develop technologies to improve fire fighter safety.

Dissemination

Dissemination of the NIOSH FFFIPP products is accomplished through a myriad of venues. A primary venue is the NIOSH Web site, designed specifically for the fire fighter program, which is available at: www.cdc.gov/niosh/fire/. The Web page contains links to all investigative reports and NIOSH publications. The Web page provides a section where users can subscribe and be automatically notified when a new product is available. There were more than 55,000 visits to the Web page in the ten-month period from January to October 2005, and the Web page was the 16th most popular page on the NIOSH site during that period. Additionally, the Web page provides links to other fire fighter related organizations and pages, including the International Association of Fire Fighters (IAFF), International Association of Fire Chiefs (IAFC), National Volunteer Fire Council (NVFC), National Wildfire Coordinating Group (NWCG), National Fire Protection Association (NFPA), and the USFA. Also, the previously listed fire related organizations and others provide links to the NIOSH FFFIPP Web site.

The FFFIPP has partnered with a number of fire service trade journals including *Firehouse*, *Fire Rescue*, *Fire Chief*, *NFPA Journal*, *Responder Safety*, *Responder Magazin*e, and *Wildland Fire* journal. These journals have reprinted over 70 fire fighter fatality report summaries in the past 18 months. The total monthly combined circulation for the six magazines is approximately 300,000, reaching a potential audience of over 1,400,000 fire service professionals per month.

NIOSH conducts periodic mass-mailings to all 30,000+ fire departments in the United States. The mass mailings are typically done once per year and may contain a packet of

five to six reports addressing a variety of situations in which fire fighters have died in the line-of-duty, or a single report thought to be of particular import for the fire service as a whole. Examples of individual reports that have been distributed to all fire departments in the United States include a warehouse fire in Massachusetts that ended in the deaths of six fire fighters (Report No. F99-47) and a training incident in California in which an instructor fell to his death demonstrating an escape procedure portrayed on a training video marketed to the fire service (Report No. F99-25). The escape procedure, which was not recommended by any fire service organization (such as the NFPA, USFA or the International Association of Fire Instructors), involved the potentially dangerous maneuver of exiting a window head first down a ladder.

The NIOSH FFFIPP also disseminates findings and products at meetings and conferences. NIOSH personnel have given more than 50 presentations at fire service, public health, and occupational medicine conferences. Most of these presentations have been at national fire service meetings (e.g. annual meetings held by the IAFC, IAFF, NFPA, and NVFC; IAFF Redmond Symposiums, Fire Department Instructors' Conference, and Firehouse Conference and Exposition) and have provided an overview of the NIOSH FFFIPP, current findings, and information on specific cases. In addition, the NIOSH FFFIPP regularly has informational booths with products for distribution at many of the fire service conferences mentioned above. NIOSH personnel have also presented FFFIPP findings at public health, occupational medicine, and safety conferences (e.g. annual meetings of the American Public Health Association, American Occupational Health Conference, National Safety Congress, American Society of Safety Engineers and National Occupational Injury Research Symposiums). Examples of specific topics presented at these meetings include medical requirements for fire fighters, changes to *NFPA 1582, Standard on Comprehensive Occupational Medical Program for Fire Departments*, safety hazards with oxygen systems, motor vehicle incidents, structure fire incidents and fatal carbon monoxide poisonings of fire fighters.

Outreach

NIOSH has conducted an extensive outreach effort to the fire service, including the formation of partnerships with fire service and other federal agencies to increase the use of the FFFIPP findings and prevention recommendations. The FFFIPP staff also provide information to and participate on committees developing standards and tools for fire fighter safety. The following paragraphs highlight some of these outreach efforts.

NIOSH partnered with the International Association of Fire Chiefs and numerous other fire service organizations in a June 2005 "stand down" for safety. The purpose of this initiative was to encourage fire departments to set aside time specifically for safety and health training. NIOSH fatality investigative reports were identified as useful tools for such training. NIOSH is currently participating on a NVFC panel administering its Healthy Heart Program. NIOSH has provided, among other things, input on how best to communicate to fire fighters regarding their risk of cardiovascular disease morbidity and mortality.

NIOSH has held several peer-review meetings to have fire service experts in cardiovascular disease critique the NIOSH FFFIPP work related to cardiovascular disease, and to provide input into future directions. Outcomes from these critiques include development of a database from NIOSH investigations of fire fighter

cardiovascular deaths, and increased NIOSH involvement in NFPA and USFA committees addressing fire fighter cardiovascular health. NIOSH is exploring opportunities for research suggested by these meetings, including studying the cost-effectiveness of various fire fighter medical screening and fitness/wellness programs, improving processes to identify fire fighters needing exercise stress testing, and studying the effect of low levels of carbon monoxide on fire fighters.

The NIOSH FFFIPP recently entered into a memorandum of understanding (partnership) with the USFA to identify collaborative efforts to improve safety and health conditions for fire fighters throughout the United States. The primary focus of the agreement involves fostering the use of NIOSH FFFIPP products and recommendations in USFA fire fighter training materials and programs. NIOSH personnel also are participating on a USFA panel updating guidance on fire fighter autopsies. NIOSH was asked to participate based on experience and expertise developed while reviewing autopsy reports during fatality investigations.

NIOSH has worked collaboratively with other agencies to leverage resources when addressing issues of common interest. For example, in July 1998, the IAFF requested that NIOSH investigate a number of non-fatal injuries involving oxygen resuscitation systems. These incidents involved the flashing of regulators used to control the flow of oxygen on these systems, resulting in burn injuries to fire fighters and emergency medical technicians. NIOSH worked collaboratively with the Food and Drug Administration (FDA) that regulates these devices, and with the National Aeronautics and Space Administration (NASA) that has a long history of relevant expertise in oxygen safety. Investigation into these events revealed that aluminum in the regulator was a contributing factor to the flash fire incidents, and that there were a number of safe handling techniques, which fire fighters and emergency medical technicians could use to reduce the risk of regulator fires. NIOSH and FDA developed a joint public health advisory (http://www.fda.gov/cdrh/oxyreg.html) that was widely distributed to the fire service, and a training video on safe handling of oxygen systems. Most of the reported flash fire incidents involved a single manufacturer who voluntarily recalled regulators and offered trade-ins with non-aluminum regulators. Although this problem with oxygen regulators was known to the FDA for a number of years, the NIOSH investigations helped to more clearly identify and document the problems and proposed solutions.

Another example of the NIOSH FFFIPP leveraging resources is a joint publication with the Federal Railroad Administration (FRA) and Operation Lifesaver. NIOSH consulted with the FRA in fire fighter fatality investigations involving trains colliding with fire apparatus. An outgrowth of this consultation was a joint publication between NIOSH, FRA, and Operation Lifesaver (a nongovernmental program dedicated to eliminating injuries from train collisions), *Your Safety - 1st: Railroad Crossing Safety for Emergency Responders* (NIOSH Publication. No. 2003-121.) This publication leveraged expertise, funding and distribution networks to develop relevant guidance specific to emergency response and to broadly disseminate the publication to the fire service and communities.

NIOSH personnel have actively participated on the *NFPA Occupational Safety and Health Technical Committee* since 2001. NIOSH personnel played an important role in the development of the 2003 edition of *NFPA 1582, Standard on Comprehensive Occupational Medical Program for Fire Departments*, ensuring that findings and

recommendations from NIOSH investigations were reflected in the revised standard. NIOSH is currently participating in the development of another revision scheduled for release in 2006. NIOSH also provided technical support in the 2005 edition of *NFPA 1581, Standard on Fire Department Infection Control Progra*m and is providing

technical support in an ongoing revision of *NFPA 1584, Recommended Practice on Rehabilitation of Members Operating at Incident Scene Operations and Training Exercises.*

In April 2005, NIOSH notified the NFPA of several fatality investigations in which PASS devices were not heard by fire fighters working near fallen fire fighters or by rapid intervention teams searching for the fire fighters. NIOSH identified potential reasons why the PASS devices may not have performed as designed, and recommended that the NFPA committee revising *NFPA 1982, Standard on Personal Alert Safety Systems (PASS)* consider modifications in testing and performance criteria. NIOSH staff from the National Personal Protective Technology Laboratory who participate on this committee are providing technical support to address these issues in the revision. The NFPA and International Association of Fire Fighters recently posted notices on their Web sites (http://www.nfpa.org/itemDetail.asp?categoryID=136&itemID=26606&URL=Codes%20and%20Standards/NFPA%20News and http://www.iaff.org/across/news/archive2005/113005pass.html, respectively) warning fire fighters that PASS devices may not function as intended under high temperature conditions based on issues raised by the NIOSH investigations and initial testing by the National Institute for Standards Technology.

Research

Although the primary focus of the NIOSH FFFIPP has been fatality investigations, based in large part on input that NIOSH received at the January 1998 stakeholders' meeting, NIOSH has undertaken different types of research as part of the NIOSH FFFIPP, both to advance fire fighter safety and health and improve the impact and relevance of the NIOSH FFFIPP. These research efforts have frequently involved leveraging of resources from other NIOSH and CDC programs. The following paragraphs highlight some of these research efforts.

FFFIPP personnel have written journal articles on a variety of topics related to fire fighter safety and health based on data analysis and literature reviews. A listing of these publications is provided in Appendix I. Fire fighter safety and health issues addressed by these articles include flashing of oxygen regulators, risk factors for injury in structure fires, and estimates of occupational transmission of bloodborne pathogens to fire fighters and emergency response personnel.

NIOSH investigations of emergency medical service workers fatally injured in ambulance crashes helped elucidate inadequate occupant protection in the patient compartment, especially given the inability for personnel to attend to patients while restrained using lap seat belts that are commonly provided in ambulance patient compartments (Report nos. FACE 2001-11, FACE 2001-12, and Report No. F2003-33). These investigation findings helped spawn and inform research largely funded through NIOSH's National Occupational Research Agenda (NORA) program and partners in the U.S. and Canadian governments, including USFA, that demonstrated the potential of

certain types of occupant restraints to provide crash protection for emergency medical services personnel while allowing them the mobility to attend to patients. These research findings have spawned additional research, again funded largely through the NIOSH NORA program, to evaluate human factors issues related to these restraints and other modifications that can be made to the patient compartment to improve safety of fire fighters and emergency medical services personnel. The NORA program is also funding a pilot project to evaluate and compare the effects of wearing bunker boots/bunker pants with wearing a station uniform in manipulating the accelerator and brake pedals of a mock-up emergency apparatus cab, and to determine if future research is needed in this area. This pilot project was proposed based on hypotheses that bulky turnout gear may negatively impact the ability of drivers to operate fire apparatus.

Beginning in 2005, NIOSH began a follow-back survey to elicit stakeholder input on line-of-duty cardiovascular disease death investigations. The survey is mailed with a copy of the final report to the fire department, union (if applicable), and the victim's family member most involved with the investigation. Input received from this follow-back survey will be used to help focus line-of-duty investigations of cardiovascular disease deaths and the final reports.

In November 2005, NIOSH was granted approval by the Office of Management and Budget to proceed with an evaluation of the NIOSH FFFIPP. The evaluation includes a nationwide survey of fire departments and a number of focus groups consisting of front-line fire fighters. The study will determine the extent to which the program's reports, recommendations, and other products are being utilized by the fire service for training, policies, practices, and other prevention efforts. The evaluation will provide insight into the impact of the FFFIPP program and help to identify enhancements that might further the program's impact. Data collection began in February 2006. NIOSH is conducting the study, largely funded by CDC, in conjunction with RTI International (a non-profit research organization).

Impact/Feedback

NIOSH has received numerous examples of how the NIOSH FFFIPP has positively impacted fire fighter safety and health. These impacts include:

- influencing or supporting federal and state legislation to improve fire fighter safety and health,
- influencing NFPA standards,
- examples of fire service agencies taking action based upon NIOSH recommendations and using FFFIPP products in fire fighter safety and health training, and
- in some cases, assisting surviving family members to understand the events surrounding the loss of their loved one.

Examples of some of these impacts that have not been previously described are provided in the following paragraphs, and examples of feedback provided by stakeholders are included in Appendix II. Much of the information that NIOSH has on the impact of the FFFIPP is anecdotal and has not been collected in a systematic fashion. NIOSH is looking forward to more quantitative input from the evaluation project noted above to guide enhancements to the FFFIPP to increase impact on fire fighter safety and health.

Findings from NIOSH fatality investigations have been referenced or used to develop both federal and state legislation aimed at improving fire fighter safety and health. Descriptive statistics from the NIOSH line-of-duty cardiovascular disease death investigation database detailing sudden cardiac death triggered by heavy physical exertions during fire suppression were used by congressional staff sponsoring the Hometown Heroes Survival Act which extended benefits to survivors of fire fighters suffering cardiac death in the line-of-duty. The NIOSH investigation of the 2001 death of a fire fighter in New York (Report No. F2001-38) was cited in the justification for a 2003 New York law, *Bradley's law*, prohibiting the use of people playing the role of victim in live-fire training.

NIOSH findings and recommendations have also been used in the development and revision of voluntary consensus standards issued by NFPA. In addition to examples described previously in the "Outreach" Section, NIOSH investigative findings have been used in the development of *NFPA 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*. This standard recommends staffing based on the types of emergency response fire departments are likely to encounter. Mr. Richard Duffy, the Secretary of the Technical Committee that developed this standard, reported that NIOSH fatality investigation reports were used extensively in development of this standard. Many provisions of this standard are also included in a counterpart for volunteer departments, *NFPA 1720*.

NIOSH has received feedback on a variety of ways in which the fire service, public safety departments, and universities are using fatality investigation reports from the NIOSH FFFIPP to improve fire fighter safety. For example, several fire departments across the country have reported using NIOSH fatality investigation reports in their fire fighter safety training. These fire departments include Baltimore City, Maryland; Howell Township, New Jersey; Mentor, OH; and, Portland, Oregon. State fire training academies, including those in Pennsylvania, West Virginia, and Tennessee also consider findings and recommendations when reviewing and developing new curriculum. For example, in Pennsylvania, the training academy instructed 1,200 local instructors to incorporate training on "accountability" into their classes based on a series of NIOSH investigations making recommendations for improving accountability on the fire scene. NIOSH is also aware of fatality investigative reports being used in university fire safety curriculums, including courses at West Virginia University and Northern Virginia Community College.

Potential Future Directions and Specific Requests for Stakeholder Input

The NIOSH FFFIPP is asking for stakeholder input to improve the program and enhance impact on fire fighter safety and health. Information provided to NIOSH at the forthcoming March 22, 2006 stakeholder meeting and through the established docket will be used to refine the program to ensure it meets the needs of stakeholders. Similarly, data collected from the forthcoming evaluation will be used to determine if adjustments to the program are needed or would be beneficial in increasing the impact of the FFFIPP on fire fighter safety and health. Pending consideration of input provided by stakeholders and data collected through the formal evaluation, in the following paragraphs NIOSH proposes general directions for the NIOSH FFFIPP for consideration and comment by

stakeholders. Specific areas that NIOSH would appreciate stakeholder input on are identified, though any input will be welcomed and considered.

Investigations

NIOSH proposes that the primary focus of the NIOSH FFFIPP continue to be fatality investigations, but that the intensity of investigations be modestly reduced to support personnel increasing involvement in other activities described in the Dissemination, Outreach and Research Sub-sections below.

The NIOSH FFFIPP does not have the resources to conduct investigations of every line-of-duty death. Many NIOSH investigations are finding similar contributory factors, and consequently repeating prevention recommendations made in previous investigations. Efforts have been made to prioritize deaths for investigation. For example, priority consideration has been given to events that account for large numbers of deaths (e.g. motor vehicle incidents and cardiovascular disease), investigations likely to result in new types of recommendations (e.g., investigations of cardiovascular disease deaths of fire fighters less than 40 years of age and deaths involving new technologies), and investigations that feed into and inform current prevention efforts of other groups (e.g. investigations that may inform standard setting, such as current revisions to *NFPA 1982, Standard on Personal Alert Safety Systems (PASS)*). Stakeholder input is requested on whether fatality investigations should continue to be the focus of the FFFIPP, with modest decreases in the intensity of fatality investigations to support more outreach and research. Stakeholder input is also requested on the types of investigations that should receive high priority for investigation, and how and when prioritization should change over time.

Dissemination

NIOSH proposes increasing efforts to develop educational documents summarizing specific hazards encountered across multiple investigations. Examples of such documents that are currently under development include NIOSH Alerts addressing cardiovascular deaths, motor vehicle-related events, training incidents, and risk versus gain decisions on the fireground. NIOSH is interested in stakeholder input on the value and need for such summary publications, how NIOSH might make such documents more useful to the fire service and occupational safety and health community, and suggestions for specific topics to address in these educational documents.

NIOSH also proposes to continue to seek novel ways to disseminate findings and products, such as working with trade journals to further disseminate NIOSH reports and findings, and the biweekly quiz on the NIOSH FFFIPP Web site that directs users to answers in NIOSH publications. NIOSH is interested in specific suggestions from stakeholders on dissemination of NIOSH reports and publications focused on fire fighter safety and health.

Outreach

NIOSH proposes to continue to aggressively conduct outreach and partnership activities to foster increased use of NIOSH FFFIPP findings and products by fire service organizations and to pursue activities that complement and support prevention efforts of others. NIOSH is interested in specific suggestions from stakeholders as well as recommended areas for concentration, e.g. participation on standard-setting committees.

Research
NIOSH proposes conducting more routine and in-depth analyses of available data on fire fighter deaths and injuries (e.g. fatality data collected and reported by USFA and NFPA, data from the National Fire Incident Reporting System, and data from occupational injury and illness databases such as the Bureau of Labor Statistics' Census of Fatal Occupational Injuries and the Consumer Product Safety Commission's National Electronic Injury Surveillance System based on a nationally representative sample of hospital emergency departments). Such analyses would be used to guide NIOSH fatality investigations; add to knowledge about patterns of fire fighter injury and illness, risk factors for injury and illness, and levels of risk experienced by fire fighters; and, identify needed improvements in available surveillance data. NIOSH is interested in stakeholder input on the value and need for NIOSH to conduct these data analyses.

Additionally, NIOSH proposes to increase efforts to foster research that builds from NIOSH investigation findings and recommendations, and to leverage resources to conduct such research. This includes seeking funding opportunities through initiatives such as NORA, as well as pursuing funding through other federal agencies and the private sector. This also includes identifying partnerships in which NIOSH would conduct formal evaluations of specific intervention efforts at the national, state or local level. Examples of such research related to cardiovascular disease were provided in the Outreach Section and include research into factors determining compliance with NFPA standards. Examples of such research related to injuries include evaluation of injury prevention interventions, such as novel comprehensive injury prevention programs in a single fire department or state-wide interventions to address a leading cause of death and injury, such as motor vehicle-related events. NIOSH is interested in stakeholder input on whether NIOSH should increase efforts to foster and conduct research that is not centered on fatality investigations, specific research that stakeholders feel is needed, and opportunities that stakeholders are aware of for NIOSH to evaluate specific interventions.

Program Evaluation
NIOSH is currently considering objective means of measuring the performance of the FFFIPP and its impact on fire fighter safety and health. Assessing trends in fire fighter deaths and injuries is a potential performance measure; however, this measure has limitations since NIOSH is a research agency without a direct role in making changes in the workplace. In addition, nearly half of the fire fighter deaths each year result from cardiovascular disease, which develops over decades. Current efforts to improve fire fighter cardiovascular health may not be realized for years and cardiovascular disease-related deaths may not decline for decades. NIOSH is interested in stakeholder input and suggestions for measuring the performance and impact of the FFFIPP.

Appendix I –Publications from the FFFIPP

NIOSH Health Hazard Evaluation Reports

Hales TR, Baldwin T [2001]. Health Hazard Evaluation Report: Madison Fire Department, Madison, WI. Cincinnati, OH: US Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, NIOSH Report No. HETA-01-0043-2844.

NIOSH [2004]. Issues related to occupational exposure to fire fighters, 1990-2001. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. No. 2004-115.

NIOSH Fact Sheet

NIOSH [1997]. NIOSH fact sheet: Exploding flashlights: Are they a serious threat to worker safety? Cincinnati, OH: Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 97-149.

NIOSH Workplace Solutions and Hazard IDs

Braddee R, Washenitz F [1999]. NIOSH Hazard ID: Fire fighting hazards during propane tank fires. Cincinnati, OH: Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 99-129.

McFall M., Schmidt E [2001]. NIOSH Hazard ID: Traffic hazards to fire fighters while working along roadways. Cincinnati, OH: Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2001-143.

Romano N [2002]. NIOSH hazard ID: Fire fighter deaths from tanker truck rollovers. Cincinnati, OH: Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2002-111.

Cortez K, Mezzanotte T [2002]. NIOSH hazard ID: Fire fighters exposed to electrical hazards during wildland fire operations. Cincinnati, OH: Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2002-112.

Tarley J, Proudfoot S, Husting E [2004]. NIOSH Workplace Solutions: Divers beware: training dives present serious hazards to fire fighters. Cincinnati, OH: Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2004-152.

Tarley J, Guglielmo C [2004]. NIOSH Workplace Solutions: Preventing deaths and injuries to fire fighters during live-fire training in acquired structures. Cincinnati, OH: Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2005-102.

NIOSH Alerts

Pettit T, Dunn V, Main G [1999]. NIOSH Alert: Request for assistance in preventing injuries and deaths of fire fighters due to structural collapse. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 99-146.

Merinar TR, Braddee RW, Washenitz F, Mezzanotte T, Dunn V, Brannigan F [2005]. NIOSH Alert: Request for assistance in preventing injuries and deaths of fire fighters due to truss system failures. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2005-132.

NIOSH Publications with Other Agencies

Food and Drug Administration, NIOSH. FDA/NIOSH Public Health Advisory: Explosions and fires in aluminum oxygen regulators. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Food and Drug Administration, February 1999.

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Appendix II- Examples of Feedback Received by the NIOSH FFFIPP

Fire department member: "*I want to extend my thanks and appreciation for your professionalism conducting during the investigation and fact-finding process. … Preventing and reducing fire fighter fatalities should be a top priority goal for every department, and to accept objective recommendations from beneficial sources and organizations such as yours. WE are currently taking your recommendations to heart with the following actions already in process for completion……"*

Fire department member: *" After receiving your voice mail message late yesterday afternoon I wanted to re-read your report in it's entirety before responding. Having done so I want to express my sincere appreciation for your diligence and thoroughness in the preparation of your report. Having been able to experience, first hand, your level of professionalism and compassion I am a true believer in the commitment and competency of you and your organization, NIOSH. I want to personally thank you on behalf of the [FD, Union, and deceased's Family] for your commitment and dedication to Firefighter's safety."*

Spouse of fatally injured fire fighter: *"On behalf of myself and Steve's entire family, I would like to thank you for writing such a comprehensive and informative report. I would especially like to thank you for placing the conclusion to "ensure that the authority to conduct firing out or burning out operations is clearly defined in the SOP and the IAP" in the first position. It pleases me greatly. Above all, I want for other firefighters to learn from the factors that may have caused my husband's death. In my opinion, the rouge backfiring was the most important one."*

Parent of fire fighter who had a fatal cardiac event: *"I am very pleased and grateful in the manner in which this investigation was handled with regards to myself and my son. Everyone who I was in contact with was not only professional, but also polite and caring. Thank you for being so kind during this process."*

Congressman James McGovern (after release of NIOSH report 99-F47 based on a Massachusetts event resulting in the deaths of 6 fire fighters): "The value of this report goes far beyond Worcester"

Deputy Fire Marshal, Colorado: "*I used the Firefighter Fatality reports published by your organization. These are invaluable as case studies to represent to our young rookies the true hazards of their job. These reports bring the aspect of safety into a reality for them. I know they are safe for having reaped the rewards from the hard work your staff puts into the reports. This is a great and invaluable service to my profession*."

Staff member from Training division of Ohio Fire Department: *"I would also like to express my department's appreciation in providing the NIOSH Firefighter, Death in the Line of Duty Reports. We recently printed dozens of the reports for the National Stand-down for Firefighter Safety for our firefighters to review…. The reports, on many occasions, hit close to home in regards to the similarities to our department. The reports stimulate changing an attitude of "it wouldn't happen here" to a attitude and belief that "it COULD happen here". I thank NIOSH for the countless lives they have saved. I*

believe the NIOSH reports are preventing deaths and serious injury by opening the eyes of those who are involved in the fire service."

Information on reader response card to NIOSH publications: *"Good publication. Mandatory for all potential incident commanders!"*

Information on reader response card to NIOSH publications: *"I find the NIOSH Reports and Alerts on fire fighter deaths very informative. We utilize the information to change attitudes."*

Information on reader response card to NIOSH publications: *"Information was shared with all members of my fire department. Fire fighters safety is my main priority. Thank you."*

Information on reader response card to NIOSH publications: *"Thank you very much. Very informative and easy to be used in our training program."*